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# Ability of Carbon Footprint (CFP) to reflect the environmental burden of a product/service – An empirical study

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## What the world is looking at today...

⇒ Extensive use of carbon footprint (CFP), which is:

- An accepted reference indicator for climate change
- An assessment of the 6 GHG of the Kyoto Protocol (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, SF<sub>6</sub>, PFCs, HFCs)

⇒ What about the consideration of other impacts on environment?

⇒ Is carbon footprint representative of other environmental impacts?



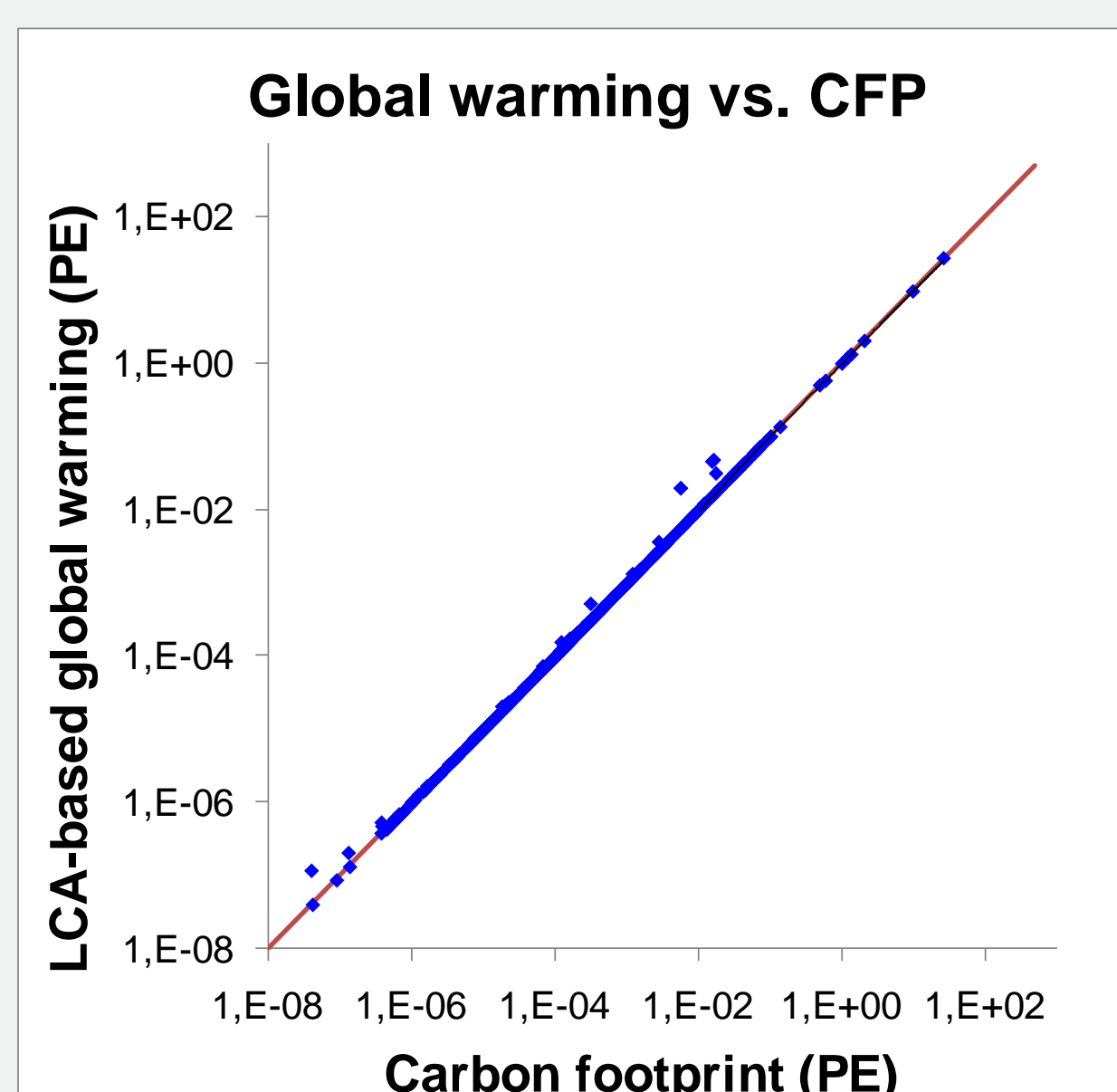
## Correlation between CFP and other environmental impacts?

### OBJECTIVES AND METHODS

- Comparisons of carbon footprint with other relevant LCA impact categories
- Inclusion of the USEtox<sup>TM</sup>-based toxic impacts:
- Normalization of all impacts (including CFP) to support the comparisons
- 637 product/service life cycle inventories tested (from Ecoinvent database)

### RESULTS

#### ● Carbon footprint vs. LCA-based global warming

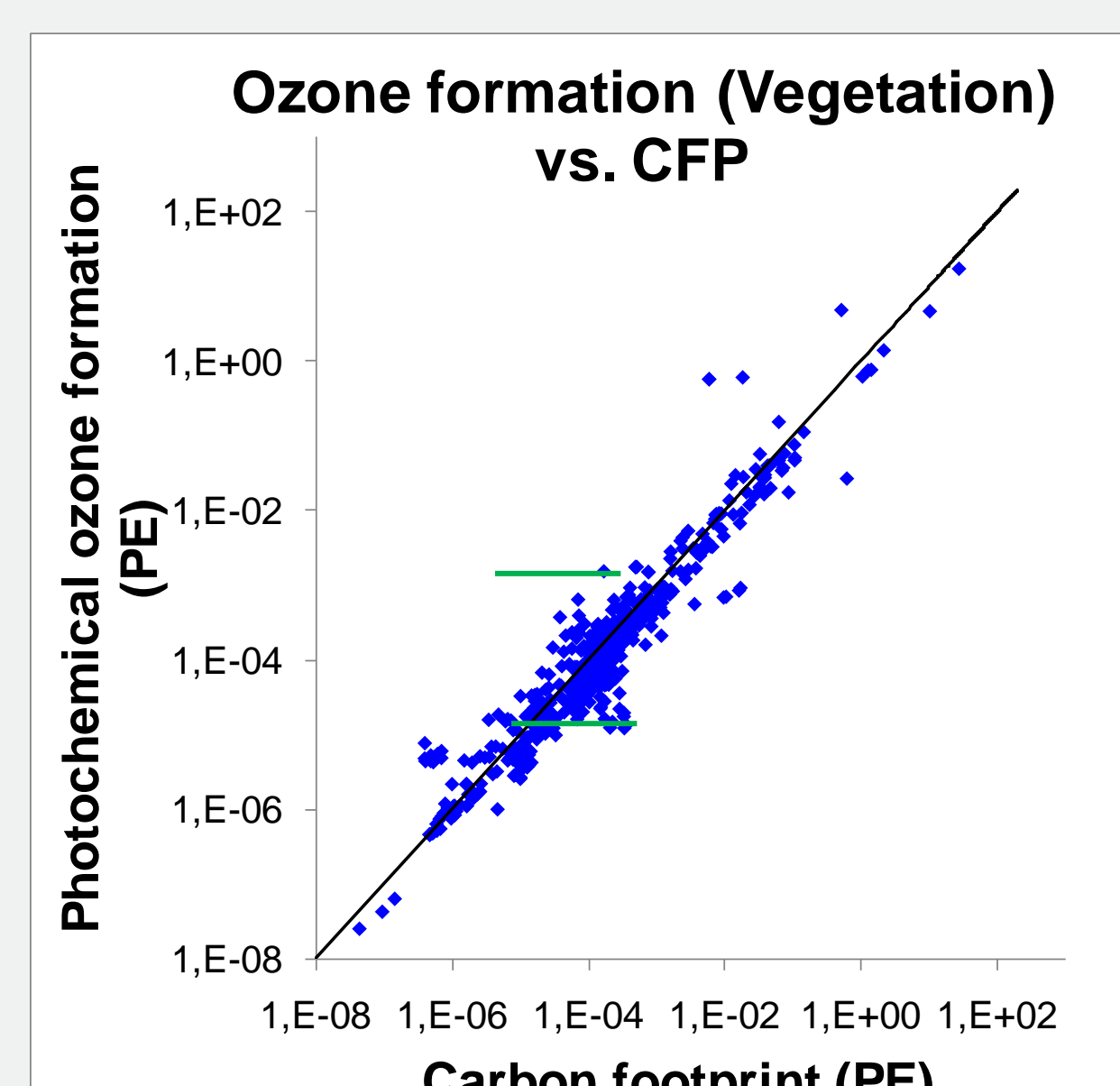


- Overall excellent match (-5% difference)
- Large differences when significant emissions of NMVOC or ODS (e.g. TCE, TFE productions)

**Carbon footprint is roughly the same as LCA-based global warming**

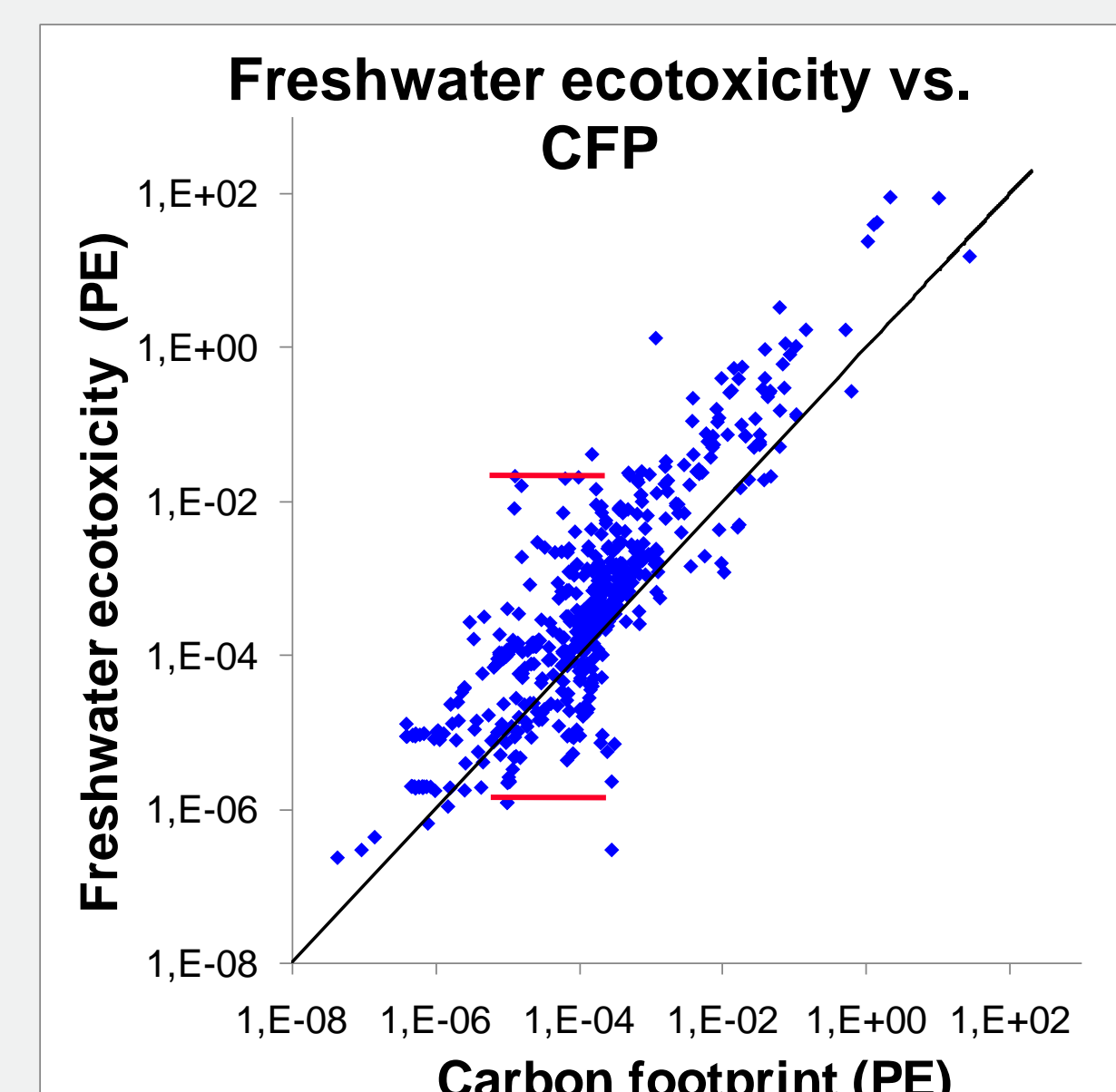
#### ● Carbon footprint vs. non-toxic impacts

- Overall good correlation for acidification, terrestrial eutrophication, photochemical ozone formation
- Impacts primarily originating from the combustion of fossil fuels used in energy production



**Carbon footprint is an acceptable representative**

#### ● Carbon footprint vs. toxic impacts



- Emissions of toxic substances arising from various processes
- No direct relation with energy production

**Carbon footprint is not an acceptable representative**

#### ● Uncertainties

Expected underestimations due to inventory incompleteness:

- Good coverage for emissions from combustion of fossils
- Limited coverage for emissions of chemicals in other processes

**Several non energy-related emissions likely to be missing**  
⇒ Real picture expected to be worse

### CONCLUSION AND PERSPECTIVES

#### ● CFP not representative in many cases

#### ● Risk of sub-optimization

Example of switch from fossil fuels to use of renewables in energy production (cf. opposite graph):

- Overlooking of human toxicity
- Risk of misinterpretation (e.g. overutilization of terms “green” or “eco-friendly”)

#### ● Further work needed to:

- Identify patterns among the different categories of products/services
- Quantify the uncertainties and their influences on the results (in particular for the toxicity-related impacts)

